

12/23/75
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MAP 1 Location Map

MAP 2 Bedrock Geology

Plate 3 Cross Section A-A

Plate 4 Cross Section B-B

PRELIMINARY REPORT

STEELE CLAIMS

GARDNER CREEK AREA

NEAR NEPHI

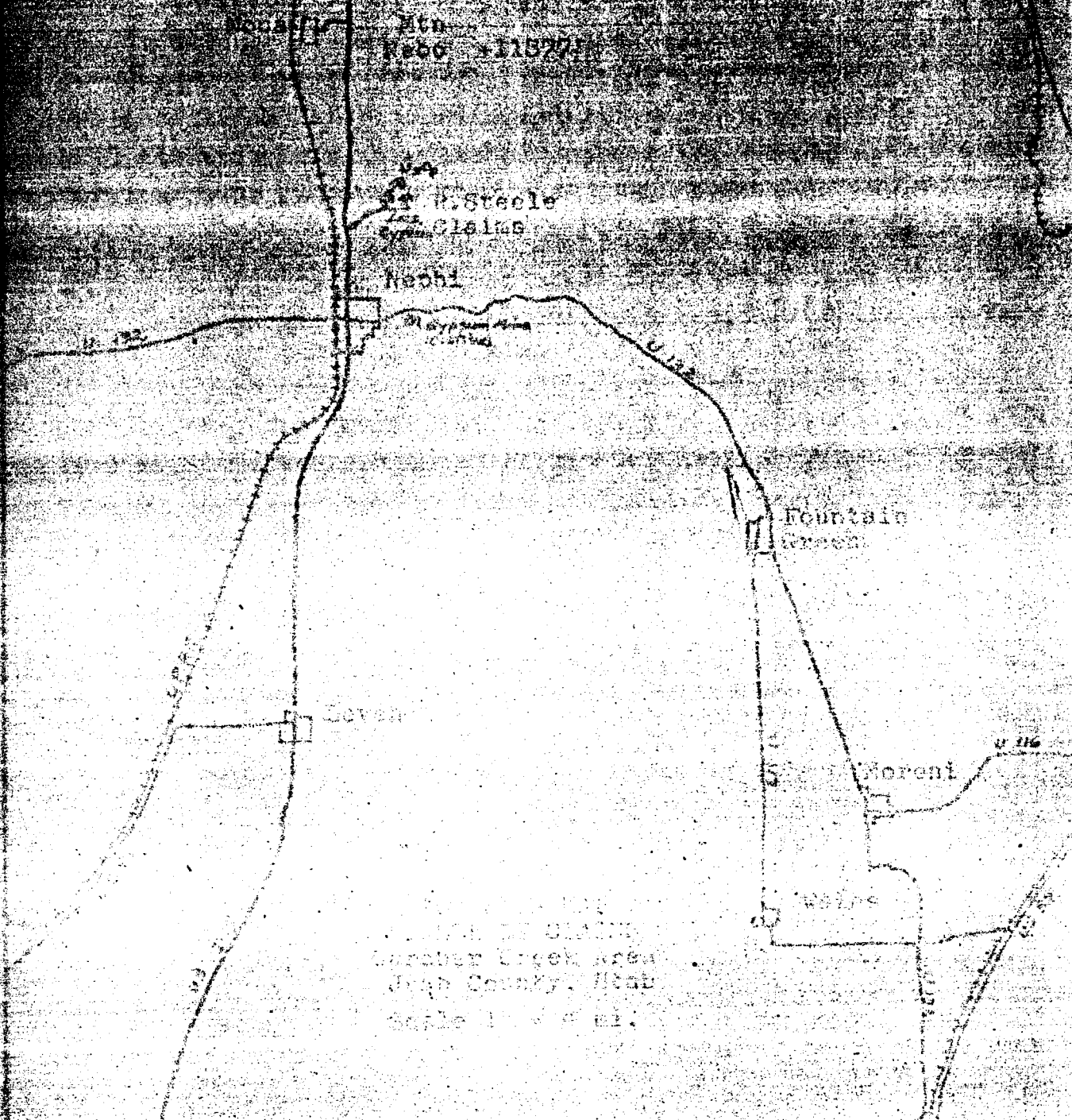
JUAB COUNTY, UTAH

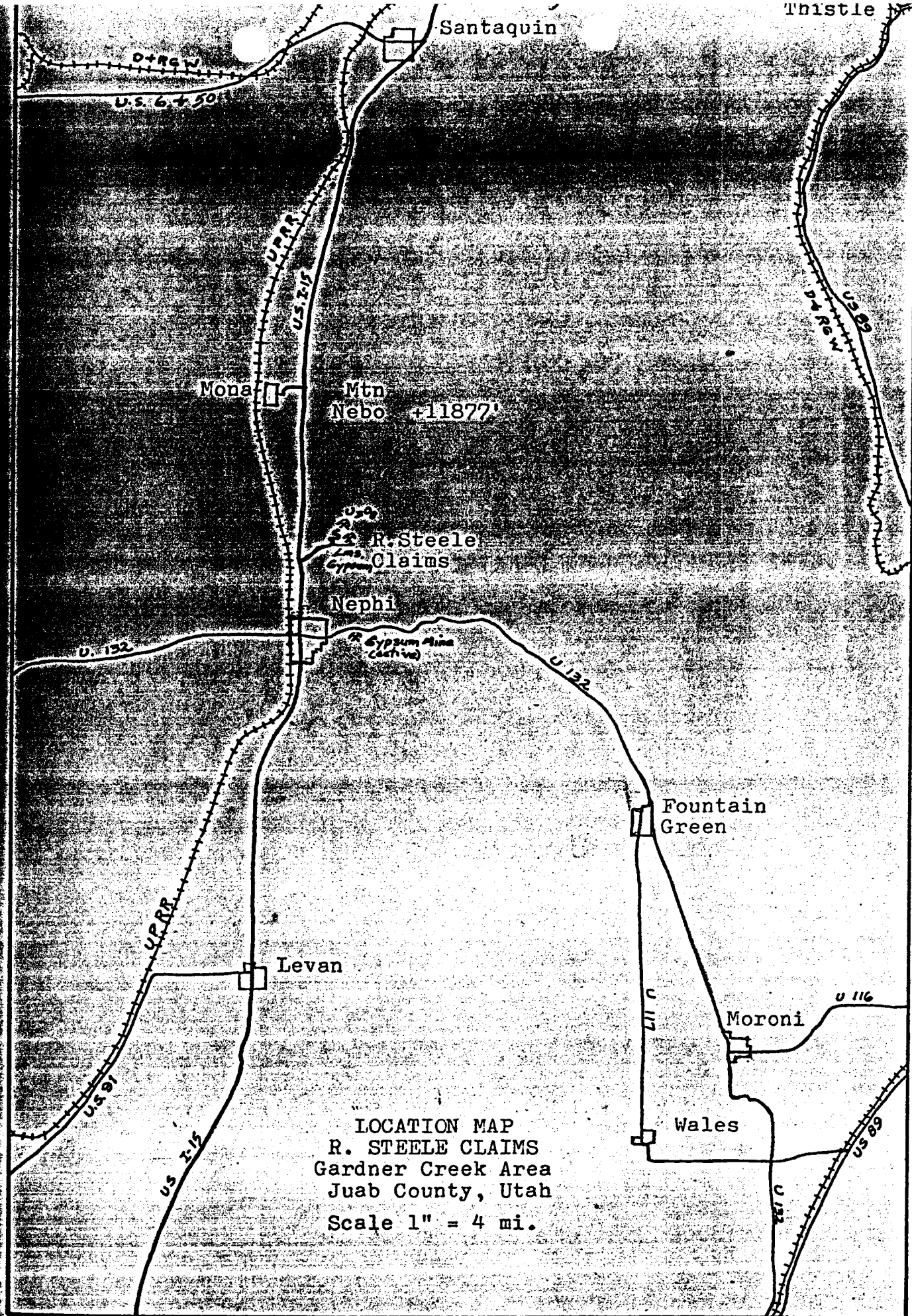
W. L. Seymour

Sept. 1975

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PRELIMINARY REPORT ON THE LIMESTONE, SILICA AND
GYPSUM DEPOSITS, R. STEELE CLAIMS, GARDNER CREEK
AREA NEAR NEPHI, JUAB COUNTY, UTAH

W. L. SEYMOUR
SEPT. 4, 1975

INTRODUCTION

In July 1975, Mr. Robert Steele of 727 North 300 East, Nephi, Utah (Tel: 801-623-1877), presented his claims in the Gardner Creek Area for consideration as possible sources of limestone from exposed beds of Jurassic Age Arapien formation that contained limestone correlative with the Twin Creek limestones currently quarried at Devil's Slide and Parley's Canyon for cement rock. The Steele claims cover a large area including most of the Gardner Creek drainage and the Little Birch Creek drainage to the north, both areas being north and northeast of Nephi. The claims were originally staked to cover ~~uranium anomalies and considerable work was completed in~~ 1970 by the Cerro Corporation of New York City in access road construction and test drilling of uranium mineralization in claims south of the Little Birch Creek drainage. Mr. Steele has continued work on the uranium deposits and has shipped some ore. The uranium area has not been studied to date by the writer.

The Steele claim area was inspected July 8 by the writer accompanied by Mr. Steele and mapped August 13, 15 and September 1.

The following is a preliminary report of findings and an evaluation of the limestone deposits with a proposal for future development considered needed to fully evaluate the deposits.

LOCATION

The Steele claims cover a large area including the central sections of the drainage basins of Gardner Creek and Little Birch Creek in an unsurveyed area in Township 12 South, Range 1 East with most of the claims in the Section 22 position. All of the claims are lode locations. A property map dated 1970 was supplied by Mr. Steele and shows a contiguous group of 61 claims. Other claims have been staked to total 114 in all.

Topography of the Steele claim area is very rugged with precipitous slopes, the elevations ranging from 5700 to 8300 feet. In the area of specific interest for limestone deposits, the elevations range from about 6000 to 6600 feet.

The Gardner Creek area investigated for this report is located approximately 4 miles north of Nephi and is accessible by driving 2.2 miles north on U. S. Highway I-15, then turning east and following an unimproved dirt road for 1.7 miles into Gardner Creek Canyon. Grades on the unimproved access road are fairly steep, averaging 8.5% for the 0.8 miles in the foothill area west of the canyon and 16% for the 0.9 miles in the canyon, an overall grade of 12.5%. However, the width of the valley floor in the area near to and west of the potential limestone deposits and extending to the mouth of the canyon is adequate for construction of an access road with an overall grade of about 10% and without extensive cuts, fills or switchbacks.

The Union Pacific Railroad branch line from Lynndyl to Salt Lake City is located approximately 2 miles west of the deposits, just west of Highway I-15.

High voltage power lines cross the area near the mouth of Gardner Creek Canyon.

A continuous flow of water discharges from Gardner Creek Canyon with sources in numerous springs located east and within the limestone area. These waters

are directed to a buried pipeline in the canyon floor and are controlled by a local irrigation company. Adequate water owned by the Nephi municipality is reported available for industrial plants according to Mr. Steele.

Topographic mapping in the area is limited to the 1:62500 Scale, 15 Minute Series Nephi and Santaquin Quadrangles, 1951, U. S. Geol. Survey. The Cerro Corp. produced a topographic and claim map for their own use in the earlier completed uranium investigation. A copy of this 400 Scale Map was supplied by Mr. Steele for this study.

Nephi is the county seat of Juab County and has a population of approximately 3000 persons. The area is generally agricultural with only minor industrial development including a rubber goods manufacturing facility in Nephi. Mining activity for gypsum is seasonal. A good, skilled labor force is deemed available in the Nephi area.

POSSIBLE PLANTSITES

If the Gardner Creek limestone deposits prove out to contain adequate reserves of good quality raw material for a cement plant, suitable plantsite areas appear available in the general area; such as, 1) near the deposit in Gardner Creek Canyon, or 2) in the foothill pasture lands west of the canyon and east of Highway I-15, or 3) in various areas near the highway and railroad north and west of Nephi. The canyon site would require special studies and possibly additional construction considerations due to flash flood hazards.

GEOLOGY

The central Gardner Creek area contains a core of early Jurassic Age (about 175 million years) rocks exposed by erosion of Gardner Creek and earlier drainages through the older rocks and a major overthrust fault. In the area, the Mtn. Nebo overthrust faulting caused a great thickness of Pennsylvanian Age and younger units to be moved from the

west-northwest to a position overlaying the younger rocks. The thrust fault zone is well exposed in the Steele area especially in road cuts and switchbacks on the uranium access road. In this area, interbedded quartzites, dolomites and limestones of the Pennsylvanian Oquirrh formation (about 300 million years) overlay the younger Jurassic limestone and shale beds.

Description of the Formations Oquirrh Formation

The Oquirrh formation consists of alternating beds of gray limestone, dolomitic limestone and quartzite that are well exposed on the north and upper east slopes and in the bottom ½ mile of Gardner Creek Canyon west of the Mtn, Nebo overthrust fault zone. These units were not mapped in detail for this report.

The Oquirrh beds cover the upper slopes and the mountain peaks east and northeast of the Steele claims in Gardner Creek Canyon. These beds have also not been mapped to date but the approximate location of the Mtn. Nebo overthrust fault has been noted of the accompanying Bedrock Geology Map, Map 2. The Oquirrh beds are located above, to the east and northeast of the fault trace.

Jurassic Units

The Geologic Map of Utah 1963 shows the Gardner Creek area as containing a central core of Jurassic Arapien formation shales with a small outcrop area of older Nugget sandstone. The geology of the area is more complicated with diverse rocks of several formations exposed, including Arapien shales that appear to overlay limestone probably equivalent to the Jurassic Twin Creek formation as present at Thistle, Utah and other areas. In the Steele area, the limestone consists of two lithologies with an interbedded gray shale, all overlaying the white Nugget sandstone.

Twin Creek Limestone

In the Gardner Creek area, a thick series of dense, fine grained buff to tan colored limestone outcrops

over a considerable area as noted on Map 2. This rock appears identical to the Twin Creek limestone mapped at Thistle approximately 24 miles to the northeast. It underlies the Mtn. Nebo overthrust fault in the eastern and northeastern parts of the Gardner Creek valley.

The Twin Creek type of limestone has been mapped in some detail as noted on Map 2 and on Section A-A' and was sampled in the area of best exposure. Sample #24 was cut from bedrock in the lower 30 feet of a thick exposure (+400') in the eastern part of Gardner Creek Canyon. It has a composition very similar to the Twin Creek beds at Thistle. Two large samples of talus material from the base of the thick exposure near the site of #24 sample were also taken. Results and comparison of samples follows:

Sample	%CaO	MgO	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃
#24 Bedrock	47.24	1.69	6.85	0.71	1.98
#27 Talus, fines	46.63	1.66	7.00		1.82
#28 Talus, coarse	47.47	1.56	6.00		1.41
Average of above	47.11	1.62	6.62		1.74
For comparison:					
Thistle lms., 58' cut sample 6/8/75	47.11	1.55	5.80		1.71

Possible tonnages of this type of material in the Gardner Creek area appear large. By assuming a down-dip extension of only 400 feet, with continuation of exposed 1200 feet of beds along strike and the measured 400 feet of thickness, the deposit would contain about 16 million tons, all deemed available to open pit mining. Drill testing is needed to assure this tonnage. Dip extension and thickness evaluation is recommended and a drill hole to test the area is proposed and will be described in detail below.

To the west and southwest of the outcrops of the fine grained Twin Creek beds are outcrops of about 300' of limestone of medium granular texture, light brown and tan in color, with considerable oolitic texture wherein the

rock is principally composed of fine concretionary growths. This unit overlays about 115 feet of gray shale with a second bed of granular limestone exposed below near the valley floor. Thickness of the lower unit was not measurable due to soil cover and valley fill. These granular limestone and the interbedded shale appear to overlay the Twin Creek type rocks but relationships in the area are obscure. A local fault maybe present between the two rock types. The geology is complicated by structural deformation related to the Mtn. Nebo overthrust faulting.

A good thickness of the granular-oolitic limestone unit is exposed in the central Gardner Creek area. See Map 2 and Section B-B'. This block extends about 800 feet along strike, has an indicated thickness of about 300 feet, and by assuming a downdip extension of 400 feet could contain approximately 8 million tons of high quality limestone available to open pit mining. Sampling of the upper bed at one site only indicates good grade rock of the following values:

Sample	%CaO	MgO	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃
#21 Bedrock, Upper	53.10	0.82	1.30	0.30	0.46
#22 Shale below ^{Lms.} #21	40.08	2.10	13.20	1.57	4.31
#23 Bedrock, Lower _{Lms.}	48.27	1.26	6.85	0.69	1.74

The upper granular-oolitic unit quality compares favorably with the known better quality limestones from other areas. This unit could be a possible future source of high quality limestone. Drilling is needed to fully evaluate. A test drill hole is proposed and will be described below. A comparison of assays on various limestones is as follows:

Limestone	%CaO	Mgo	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃
Upper granular-oolitic Steele area	53.10	0.82	1.30	0.30	0.46
Ophir Limestone Chaffin Quarry	52.62	2.36	0.86		0.57
Dome Limestone Allsop Area	54.67	1.01	0.66		
Great Blue Limestone Topliff Quarry	51.89	1.10	3.81		0.85

Arapien Shale

The shale units designated as of the Arapien formation outcrop north of the mapped area in the vicinity of the uranium prospects. There they are dark gray, thin bedded shales with a very pronounced crinkled texture. In the mapped area, similar shales are exposed near the overthrust fault zone in a roadcut on the access road to the uranium area. This exposure is quite small. Sample #25 cut across this outcrop ran as follows:

<u>%CaO</u>	<u>MgO</u>	<u>SiO₂</u>	<u>Fe₂O₃</u>	<u>Al₂O₃</u>
40.68	1.82	11.20	1.62	4.15

The assay indicates the rock is similar to the shale interbedded with the granular-oolitic limestones and possibly the same unit, a shaly limestone rather than a good source of alumina. Relationship of the crinkled shale to the gray interbedded shale is not known, but the crinkled Arapien appears to overlay the granular type limestone in the unmapped area to the north.

PROPOSED DEVELOPMENT

To further evaluate the R. Steele limestone deposits, two (2) drill tests are proposed; the first, to test the depth extent and continuity of the fine grained, dense Twin Creek type limestone as exposed in Gardner Creek Canyon near the end of the access road; and the second, to test the granular-oolitic limestone to the west. Map 2 shows the proposed drill sites and the location of Cross Sections A-A' and B-B'.

Proposed Diamond Drill Hole "A" is planned to test the Twin Creek type limestone section above the elevation of the canyon floor (about 6000 feet) and approximately 400 feet behind the outcrop. See Section A-A' Plate 3. The proposed direction is South 20 degrees West at a dip of minus 50 degrees. Proposed depth is 550 feet. An alternate vertical hole is shown of Section A-A' in case of drilling difficulties but this hole would not yield equivalent information.

Access to the drilling site will require construction of about 2350 feet of road extending from the present access road to the uranium prospects. The proposed road is noted on Map 2. This road will cross a flow of water sufficient to contain for haulage or pumping to the drill sites for drilling purposes.

Proposed Diamond Drill Hole "B" is planned to test the depth extension and continuity of the medium grained, granular-politic limestone. The proposed direction is South 20 degrees West at a dip of minus 50 degrees. The depth of hole needed is estimated as about 500 feet. Access to the drill site will require construction of an access spur for 300 feet off the road to Drill Site "A".

The proposed drill holes have been laid out to be drilled normal, or nearly normal, to the limestone beddings. This is recommended to expedite core recoveries and to yield the best rock information.

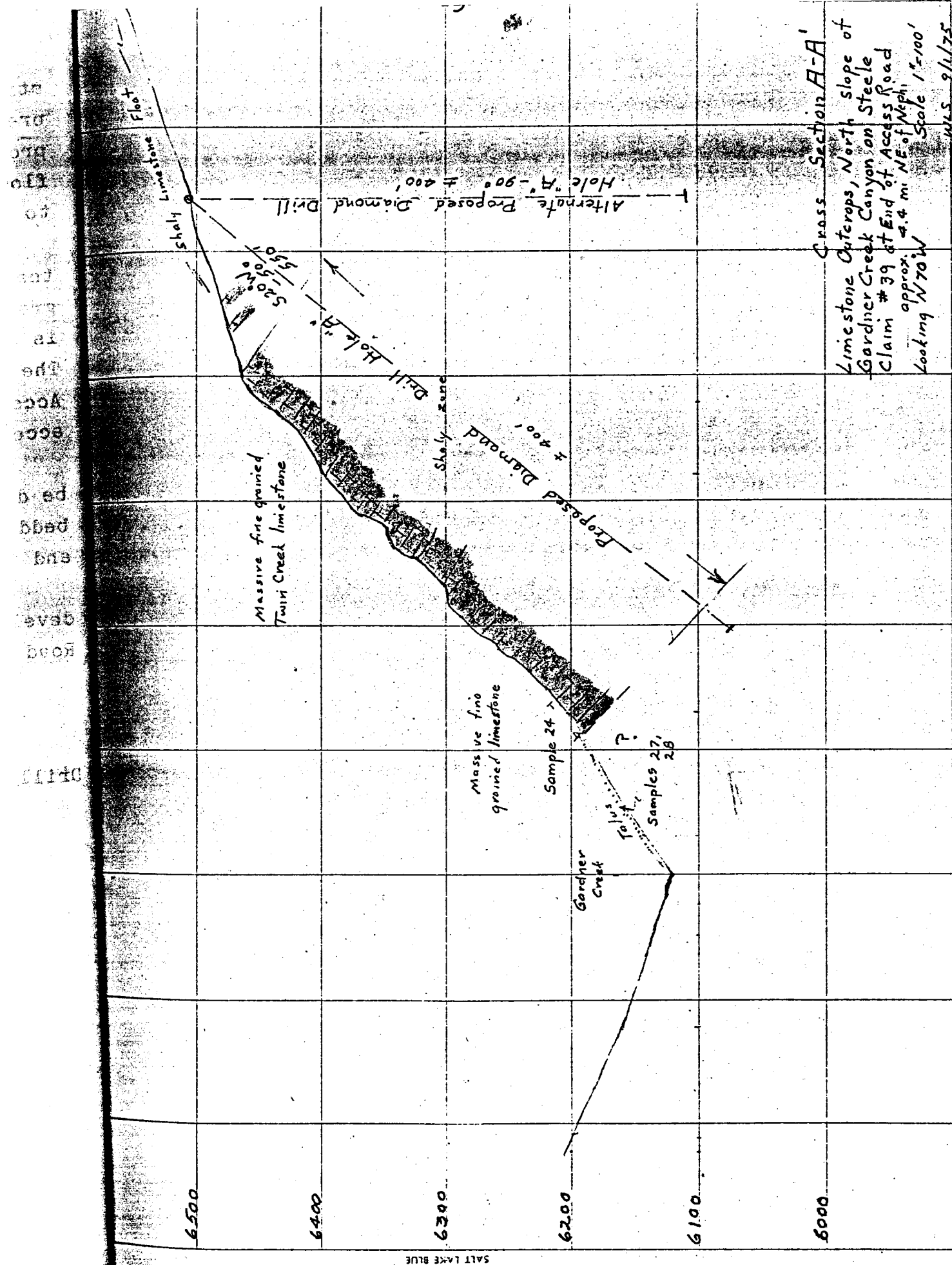
A preliminary cost estimate for the proposed development work is as follows:

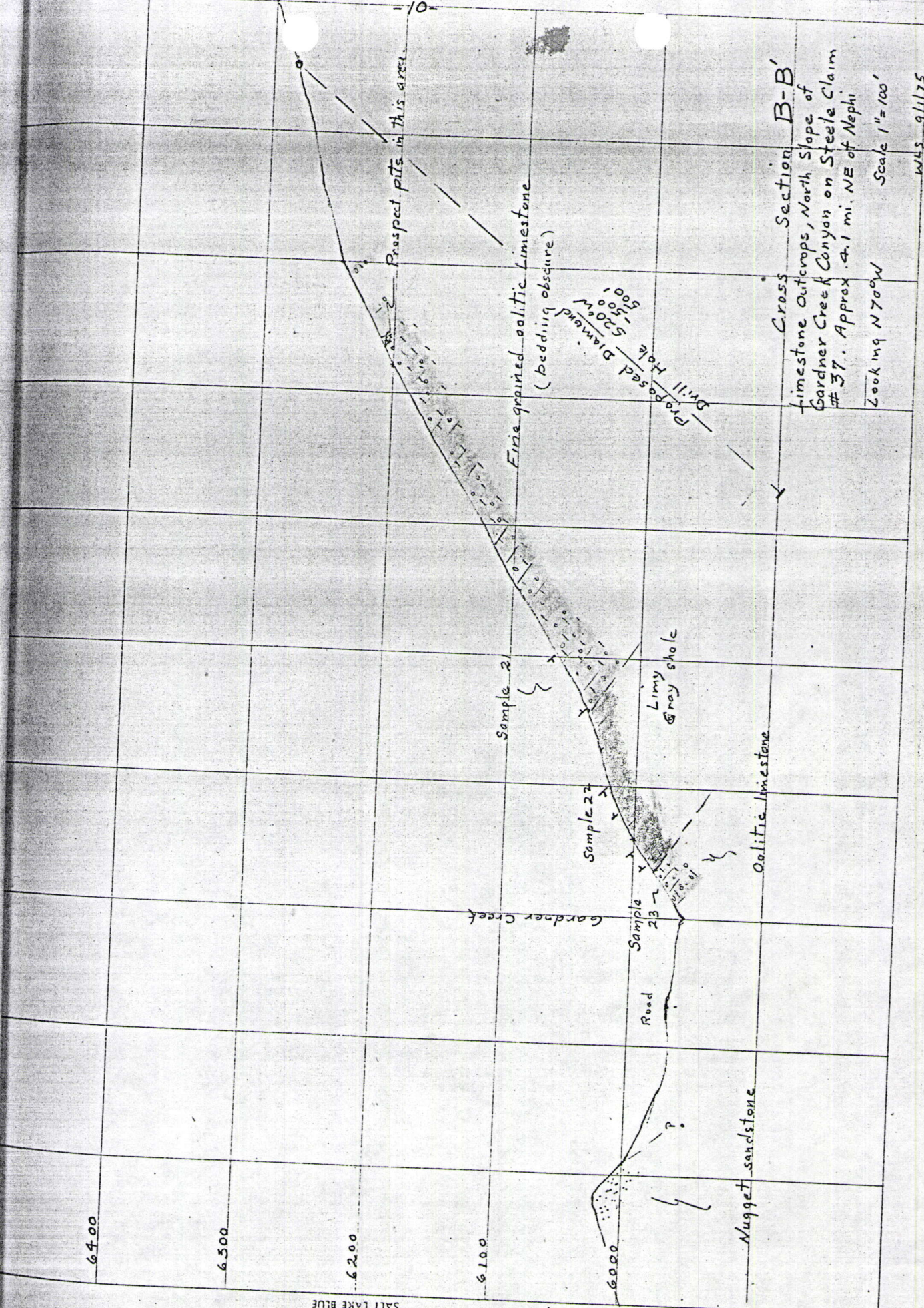
Road Construction

Dozing-3 days @ \$45 per hour	\$1080
Mobilization, 2 days @ \$200	<u>400</u>
Sub Total	\$1480

Drilling

Mobilization	\$1000
1050 ft. @ \$12/ft.	12600
Engineering & Geology @ \$5/ft.	5250
Assaying @ \$2.50/ft.	2625
Site Preparations, 2 @ \$250	<u>500</u>
Sub Total	\$21975
10% contingency	<u>2345</u>
Total	\$25790





Cross Section B-B
Limestone Outcrops, North Slope of
Gardner Creek Canyon on Steele Claim
#37. Approx. 4.1 mi. NE of Nephi
Looking N 70° W
Scale 1" = 100'
WLS 9/1/75

GYPSUM OCCURRENCES, GARDNER CREEK AREA

Several deposits of gypsum are present in the Gardner Creek area, one of which outcrops near to and south of the "A" drill test site. The gypsum deposits have not been mapped to date but appear to be zones of Twin Creek limestone replaced by gypsum derived from solutions penetrating the limestone beds in folded and brecciated zones near and below the Mtn. Nebo overthrust fault. Other and extensive deposits appear likely to be present higher on the slopes to the east. These areas have been noted on Map 2.

Detailed mapping and possibly drilling will be needed to fully evaluate the gypsum potential, but from the surface showings it appears highly likely that an adequate supply of quality gypsum can be developed in the Gardner Creek area.

SILICA DEPOSITS

The Nugget sandstone outcrops on the south side of Gardner Creek opposite the oolitic limestone area. The white sandstone is not well exposed but appears to be extensive and probably continuing to the south for some distance. More mapping is needed to delineate the formation but from the surface showings it appears a good, open pit minable source of silica is probably present adjacent to the limestone deposits.

A sample cut across the sandstone outcrop contained 93% SiO₂.

SHALE (CLAY) OCCURRENCES

The two separate shale horizons mapped in the Gardner Creek area were sampled as noted above but neither deposit appear to contain a good source of Al₂O₃ for cement rock blending, both being essentially shaly limestones. Some use of the material maybe warranted due to the proximity to the other raw materials.

Recent studies in the Allsop Claim and adjacent areas west of Bloom Siding, Millard County, has shown the

presence of good, minable high alumina shales in outcrop areas both north and south of the Allsop Quarry. These occurrences are on claims staked as part of the regional geologic study and recently tested by trenching and sampling. The JAM 3 Placer Claim in Section 18, T. 21 S., R. 9 W. contains a good shale bed of unknown but considerable thickness that assayed 53.34% SiO₂, 20.96% Al₂O₃, 6.43% Fe₂O₃, 2.84% CaO and 1.40% MgO. This shale underlays the Allsop Quarry Dome Limestone and is believed to be a unit in the Lower Cambrian Pioche formation. Similar rocks maybe present in areas nearer Nephi.

Trenching and sampling recently completed on the PEP Placer Claim south of the Allsop Quarry in Section 11, T. 22 S., R. 10 W. disclosed presence of a shale unit in beds overlaying the Dome limestone, probably in the middle Cambrian age Swazey-Whirlwind formation. This material assayed 52.00% SiO₂, 23.27% Al₂O₃, Fe₂O₃, 3.76% CaO and 1.47% MgO. The bedrock exposure is not adequate to permit full evaluation due to the steep slopes and difficult trenching conditions but an excellent, minable shale deposit is probably available at this site.

Other sources of suitable alumina bearing rock probably can be found close to the Gardner Creek deposits.

Respectfully submitted,

W. L. Seymour

W. L. Seymour
September 4, 1975

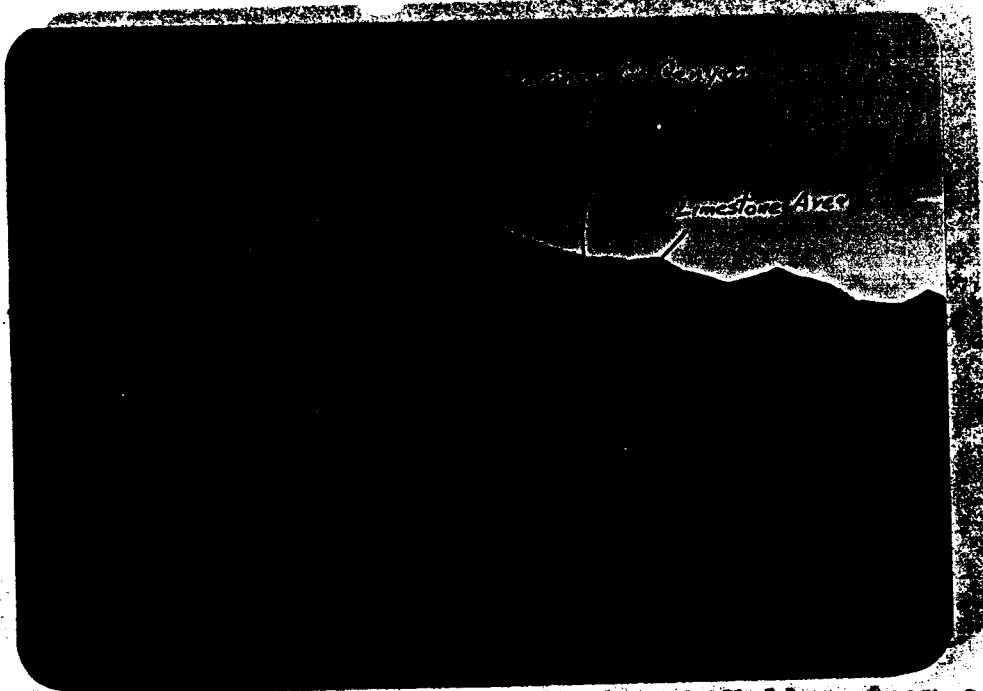


Photo #3 Looking West towards Jumb Valley from a
 Photos #1 Looking East into Gardner Creek Canyon
 from U.S. Highway 159 road to uranium
 area. Limestone area behind viewer.



Photo #2 Looking East into Gardner Creek Canyon from
 Access Road at U. S. Forest boundary.

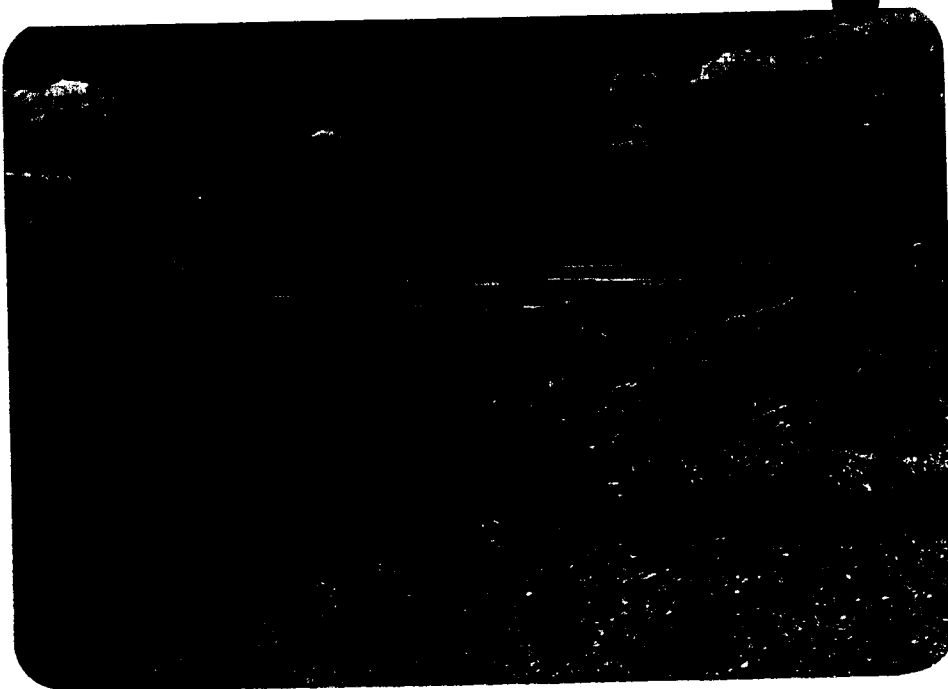


Photo #3 Looking West towards Juab Valley from a Mid-canyon Ridge in Gardner Creek Canyon at lower turn in access road to uranium area. Limestone area behind viewer.

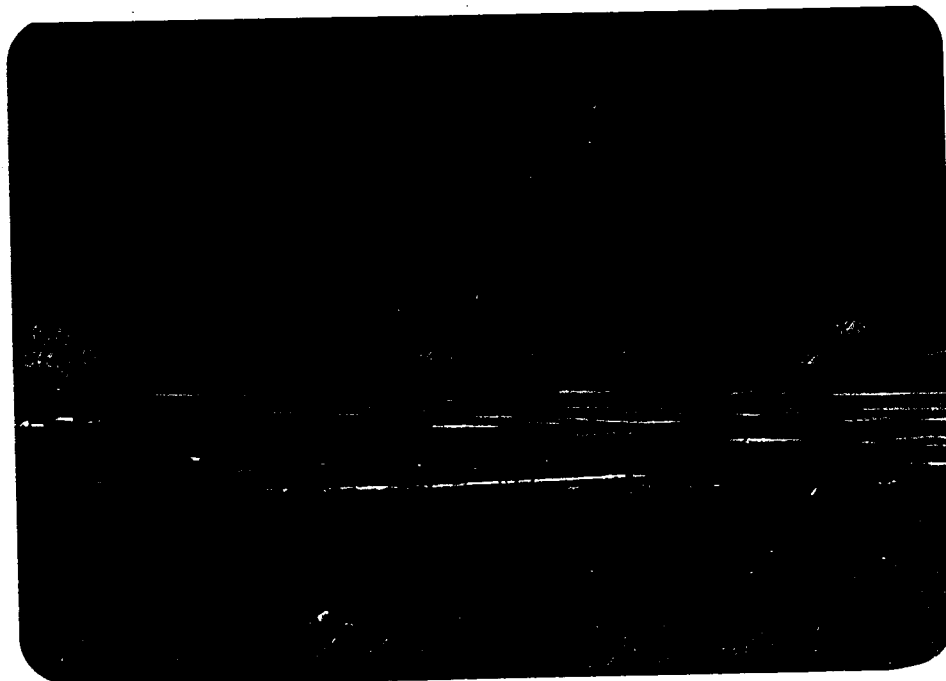


Photo #4 Looking Southwest down foothill area from Mouth of Gardner Creek Canyon. Nephi, Utah to immediate left of picture.

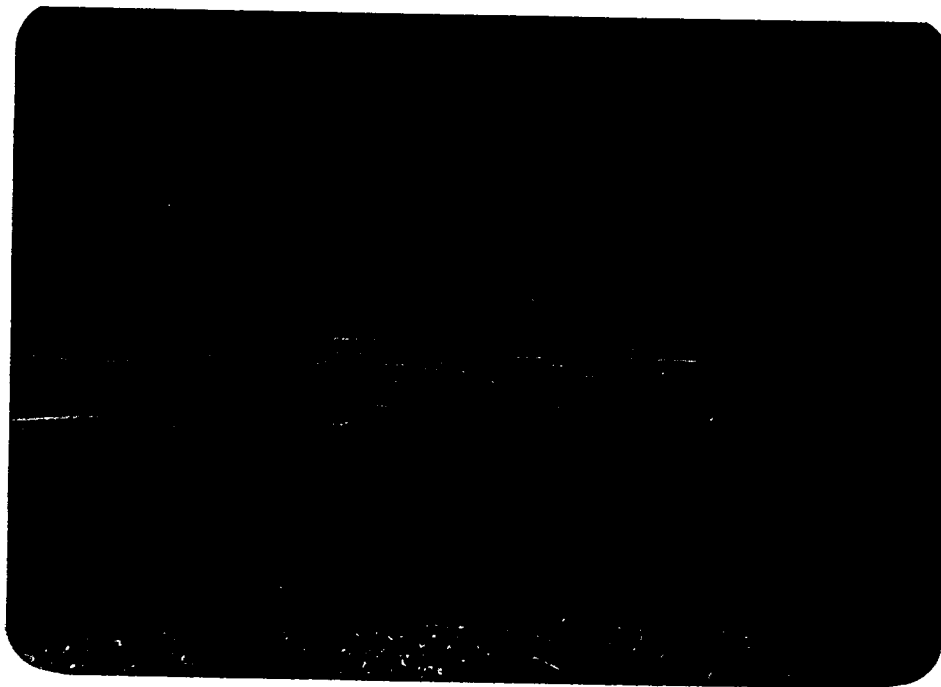


Photo #5 Looking more Westerly than in Photo #4
Note power line in foreground

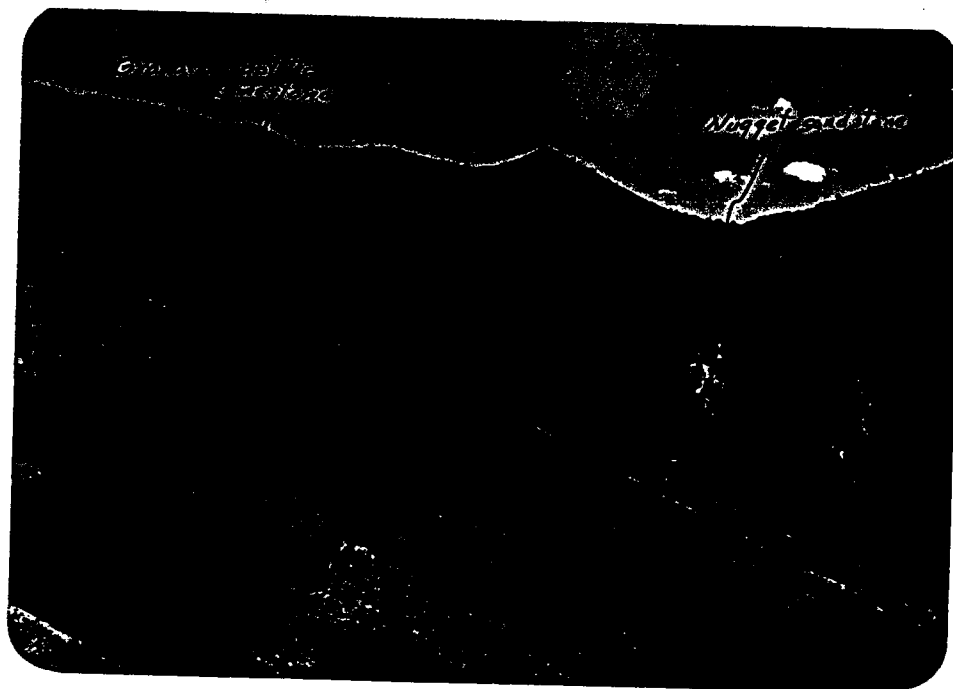


Photo # 6 Looking Southeast across Gardner Creek
Canyon from a point near the West Contact
of the Twin Creek Limestone

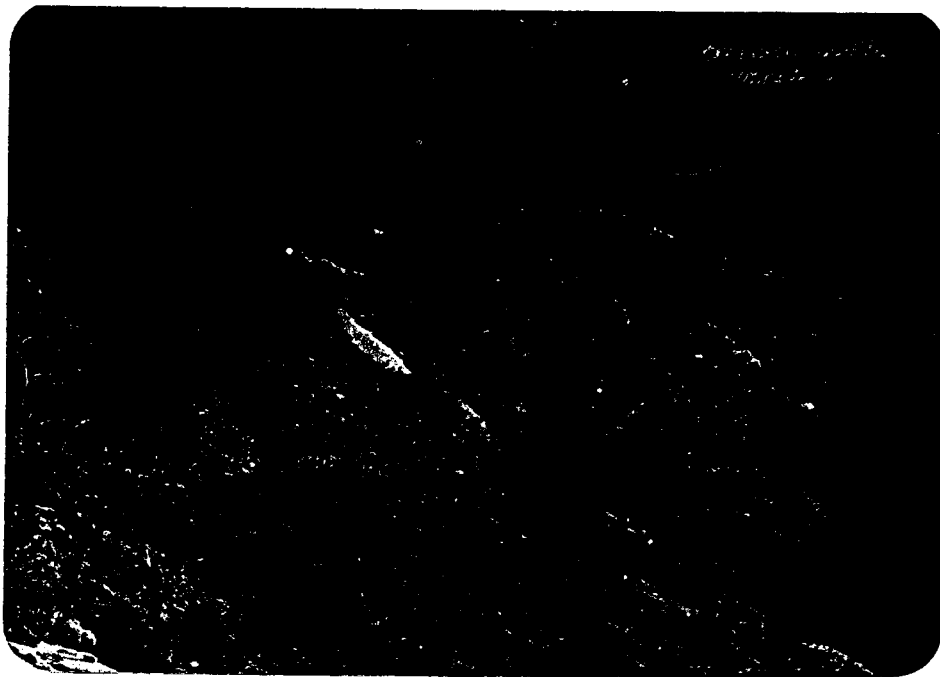


Photo #7 Looking East from the same point as Photo #3



Photo # 8 Looking East up Gardner Creek Canyon



Photo #9 Looking Northeasterly up Gardner Creek Canyon